BALUSTER SECURING SYSTEM

BACKGROUND OF THE INVENTION

Field of the Invention:

This invention relates to a baluster securing system for preventing the rotation of balusters in a railing system about their longitudinal axis and more particularly relates to a baluster securing system to prevent curved balusters from being rotated to expose a wider opening between the balusters.

Background:

Railing systems are commonly used to protect the periphery of balconies, outdoor decks and stairways to prevent individuals from falling from those areas. Railing systems are commonly made up of vertical support posts which are affixed to the periphery in spaced relation with upper and lower rails extending horizontally between the posts. A plurality of balusters are interposed between the rails to extend vertically in spaced relation. The width of the space between adjacent balusters is carefully established in order to ensure that young children, pets and the like cannot slip between the balusters to fall from the balcony, outdoor deck or stairway. The maximum width between adjacent balusters is usually determined pursuant to legislation as a part of a "Building Code" for a particular jurisdiction.

In addition to providing significant safety to occupants in preventing falls from balconies, outdoor decks and stairways, railing systems can also provide an appealing aesthetic element to buildings. Balusters of varying shapes and configurations can be selected while maintaining the safety parameters while in use. A particularly attractive form of baluster is a baluster which includes a curved portion extending outwardly from the plane defined by the upper and lower rails. When in use, a series of curved balusters in a row are usually positioned with the curved portion of the balusters oriented in the

same direction for all balusters, usually outwardly with the plane defined by the curve perpendicular to the plane defined by the rails. This not only provides a uniform attractive appearance, it ensures that the distance between the balusters remains consistent throughout the length of the baluster and remains within the necessary Building Code requirements of maximum distance between adjacent balusters.

However one problem with the curved balusters is the danger that a small child or other individual will attempt to rotate adjacent balusters in opposite directions about the baluster longitudinal axis so that the curved portions are oriented in a direction away from each other. Because the balusters are curved, the distance between adjacent curved portions of balusters rotated in this manner is greater than the maximum distance required pursuant to a Building Code. Balusters are generally positioned with respect to one another at or very near the maximum distance stipulated by a Building Code to provide maximum allowable open space between balusters to facilitate viewing through a railing system. Any rotation of a curved baluster in this matter, even to a small degree, will increase the distance between the balusters in the area of the curved portion beyond that stipulated by a Building Code. Furthermore, the ability of a curved baluster to be rotated about its longitudinal axis thereby widening the distance between adjacent balusters will constitute considerable danger as it could permit a person or animal to slip between the balusters and fall from the balcony, outdoor deck or stairway. This could cause serious injury or death.

This problem can be exacerbated due to the fact that the curved portion of the baluster provides a region where leveraged force can be applied in rotating a baluster about its longitudinal axis. A lesser amount of force is required to rotate the baluster about its longitudinal axis at the outer periphery of the curved portion, as compared to a baluster which is not curved. The potential for the application of leveraged force in this manner can make it more difficult to secure the baluster between the rails in a manner which prevents such rotational baluster movement.

Furthermore, railing systems having a very desirable appearance and easy of assembly have been developed wherein the rails are made of wood and the balusters are made of metal such as aluminium. In such a railing system the balusters are made of much stronger material as compared to the rails. If the metal balusters in such a system are curved, it is relatively easy for the balusters to be rotated about their longitudinal axis against the retaining pressure of the soft wood thereby increasing the distance between the curved portions beyond that stipulated by a Building Code.

As a consequence, there is a need for a railing system which includes curved balusters which cannot be rotated about their longitudinal axis in order to maintain the balusters in a uniform position with the distance between the balusters remaining within the requirements of a particular Building Code.

SUMMARY OF THE INVENTION

The subject invention provides a railing system which includes a pair of supporting posts, upper and lower rails extending between the posts and a plurality of balusters extending between the upper and lower rails, each baluster having a longitudinal axis and a curved portion. Each baluster includes an opening extending through the baluster in a direction perpendicular to the longitudinal axis. An extension member extends through each opening of the plurality of balusters thereby preventing the balusters from rotating about their longitudinal axes.

In a further aspect of the invention, the openings may be located in the plurality of balusters in a direction perpendicular to a plane defined by the curved portion of the baluster;

In another aspect of the invention, the curved portion is curved to a degree where leveraged force may be applied on the curved portion of a baluster to rotate the baluster about its longitudinal axes.

In another aspect of the invention, the upper and lower rails are made of softer material as compared to the balusters.

In yet another aspect of the invention, an end of the extension member is connected to one of the posts.

In a further aspect of the invention, the balusters comprise upper and lower ends in axial alignment along the longitudinal axis of the balusters with the curved portion located between the upper and lower ends.

In another aspect of the invention, the openings are located in the upper end of the balusters.

In another aspect of the invention, the openings are aligned with one another when positioned between the upper and lower rails.

In another aspect of the invention, each opening has parallel side edges and parallel upper and lower edges.

In yet another aspect of the invention, each opening is asymmetrical about the longitudinal axis of the baluster and the cross-sectional dimensions of the extension member correspond to the dimensions of the opening to enable the extension member to enter the openings of a plurality of balusters only when the balusters are aligned with the curved portion in the same direction. Optionally, the openings of the balusters and the cross-sectional dimension of the extension member may be "D" shaped. As another option, the openings of the balusters and the cross-sectional dimension of the extension member may be triangular shaped. As a further option, one side of the opening is parallel with the longitudinal axis of the baluster.

In another aspect of the invention the openings may be dimensioned sufficiently larger in the direction corresponding to the longitudinal axis of the baluster as compared to the

corresponding cross-sectional dimensions of the extension member to permit the extension member to extend through the openings of a plurality of balusters in a railing system slanted to be positioned adjacent a stairway.

In a further aspect of the invention, the opening may include upper and lower sides angled sufficiently to permit the extension member to extend through the openings of a plurality of balusters in a railing system slanted to be positioned adjacent a stairway.

DESCRIPTION OF THE DRAWINGS

Figure 1 is a perspective view of a railing system of the present invention;

Figure 2 is a front plan view of the railing system of Figure 1;

Figure 3 is a side view of a curved baluster between upper and lower rails of the railing system of Figure 1;

Figure 3A is a close-up view of the opening in the baluster of Figure 3;

Figure 4 is a perspective view of a segment of the railing system of Figure 1 with a pair of adjacent balusters in proper alignment and an extension member extending through the baluster openings;

Figure 4A is a close-up view of the pair of balusters and extension member of Figure 4;

Figure 5 is a perspective view of a segment of the railing system of Figure 1 with adjacent balusters positioned with curved sections apart;

Figure 6 is a perspective view of a segment of the railing system of Figure 1 with adjacent balusters positioned with curved sections facing opposite directions;

Figure 6A is a side view of the balusters of Figure 6;

Figure 6B is a close-up view of the balusters of Figure 6;

Figure 7 is a front plan view of a railing system of the present invention adjacent a set of stairs;

Figure 7A is a close-up view of a baluster of Figure 7 with extension member extending through the baluster opening;

Figure 8 is a front view of a baluster and extension member of Figure 7 with the extension member in a position angled closest to the horizontal;

Figure 8A is a close-up view of the baluster and extension member of Figure 8;

Figure 9 is a front view of the baluster and extension member of Figure 8 with the extension member in a position angled closest to the vertical;

Figure 9A is a close-up view of the baluster and extension member of Figure 9;

Figure 10 is a front view of the baluster and extension member of Figure 8 with the extension member in a position between the positions shown in Figure 8 and Figure 9;

Figure 10A is a close-up view of the baluster and extension member of Figure 10.

DETAILED DESCRIPTION OF THE PREFERRED EMBODIMENT

Figures 1 and 2 depict a railing system 10 comprising left vertical post 12 and right vertical post 13 for attaching to a support surface (not shown) to support railing system 10. Upper rail 14 extends vertically between posts 12 and 13 and is attached to posts adjacent an upper region of posts 12 and 13. Lower rail 16 extends vertically between

posts 12 and 13 and is attached to posts 12 and 13 adjacent a lower region of posts 12 and 13. Lower rail 16 extends between posts 12 and 13 in a direction parallel to that of upper rail 14.

Optionally, cap rail 18 may be attached to upper rail 14 to provide protection to rail 14 and to provide further aesthetic appeal to railing system 10.

A plurality of balusters 20 extend between upper and lower rails 14 and 16 with a pre-selected distance between balusters dimensioned to meet or exceed building code requirements in the jurisdiction of construction of railing system 10.

Balusters 20 are parallel with one another and with posts 12 and 13 extending into openings formed in the lower face 22 of upper rail 14 and in upper face 24 of lower rail 16.

Railing system 10 and its construction is similar to that described in United States patent application serial number 10/216,649 and published February 12, 2004, the contents of which are hereby incorporated by reference.

Balusters 20 each include identical curved portions 30 extending from the longitudinal axis of balusters 20 as seen best in Figure 3.

As seen in Figures 3 and 3A, opening 26 extends through balusters 20. Extension member 28 is dimensioned to fit into and extend through openings 26 of a plurality of balusters 20. Openings 26 are positioned in the same position on the plurality of balusters 20 and extension member 28 is aligned horizontally between posts 12 and 13, parallel with upper and lower rails 14 and 16.

Openings 26 are positioned in an upper portion of balusters 20 with each opening 26 positioned in horizontal alignment when assembled in railing system 10. Openings 26

are located in a direction perpendicular to the plane defined by curved position 30, that is the plane defined by the drawing sheet containing Figure 3.

Referring to Figure 3A, opening 26 includes vertical face 32 connected to opposed upper angled face 34 and lower angled face 36 to form apex 38 between faces 34 and 36. Apex 38 is positioned further from face 32 as compared to faces 34 and 36 with faces 32, 34 and 36 forming a generally triangular-shaped cross-section of opening 26.

Referring to Figures and 4 and 4A, extension member 28 is shown extending through to adjacent balusters 20 of railing system 10. In these views, curved portion 30 of each baluster 20 is in alignment positioned to face outwardly from the deck when positioned between upper and lower rails 14 and 16. As best seen in Figure 4A apex 38 of each baluster 20 opening 26 is in alignment facing outwardly.

Extension member 28 has a cross-section identical to that of opening 26 with upper angled face 40 and lower angled face 42 forming apex 44. The other side of extension member 28 is generally flat to conform to vertical face 32. When extension member 28 extends through openings 26 as depicted in Figure 4A, apex 44 is aligned with apex 38; upper angled face 40 is aligned with upper angled face 34; lower angled face 42 is aligned with lower angled face 36 and the vertical rear face of extension member 28 is aligned with vertical face 32. This provides a relatively tight fit between opening 26 and extension member 28 although opening 26 is dimensioned slightly larger than extension member 28 to permit extension member to slide through opening 26. Furthermore, because extension member 28 passes through a plurality of balusters, as depicted in Figure 2, extension member 28 will prevent balusters 20 from rotating about their longitudinal axis 46.

Figure 5 depicts the significant problem associated with railing systems 10 which incorporate a plurality of balusters 20 having a curved portion 30. Unwanted rotation of balusters 20 about their longitudinal axis 46 may occur, thereby increasing the distance between adjacent baluster 20 at the curved position 30 of the baluster. The distance

between balusters 20 is carefully determined in order to prevent someone from inadvertently passing through between adjacent balusters 20 and falling from the deck or balcony. Most jurisdictions have very strict building codes stipulating the maximum distance permitted between balusters 20. When straight balusters, that is balusters which do not include a curved portion, are rotated about their longitudinal axis, the distance between balusters remains unchanged between the upper and lower rails. However, when curved balusters 20 as depicted in Figures 1 and 2, are employed, a significant widening of the distance between adjacent balusters 20 can occur. The distance between balusters 20 can exceed the maximum distance gap permitted between adjacent balusters 20 in accordance with relevant building code provisions.

Right-sided baluster 48 has been rotated in a counter-clockwise direction when looking downwardly, that is in the direction of arrow 50, about longitudinal axis 46. Left-side baluster 52 has been rotated in a clockwise direction when viewed downwardly, in the direction of arrow 54. Balusters 48 and 52 are then aligned with their curved position 30 defining a plane parallel with the plane defined by upper and lower rails 14 and 16. If balusters 20 are separated from each other a distance within building code requirements, as depicted in Figures 1 and 2, the distance between adjacent balusters 56 is at or below the maximum code distance permitted. When properly aligned, distance 56 is the same throughout the length of balusters 20 between upper and lower rails 14 and 16, as depicted in Figure 2. This distance 56 is also the same as the distance between rotated balusters as depicted in Figure 5, adjacent lower and upper faces 22 and 24. However, distance 58 between balusters 48 and 52 adjacent curved portions 30 is much greater than distance 56 and would exceed the maximum distance between balusters as stipulated by building codes. Distance 58 could be large enough to permit a child or animal to slip between balusters 48 and 52 to fall from the deck or balcony causing serious injury or death.

This problem is particularly acute where the upper and lower rails 14 and 16 are made of much softer material, such as wood, as compared to balusters 48 and 50, constructed of metal such as aluminum. Furthermore, balusters 48 and 52 are often

round in shape for aesthetic reasons and ease of construction and this causes further difficulties in attempting to prevent rotation of balusters 48 and 52 about their respective longitudinal axes 46 in the direction of arrow 50 or arrow 54. The subject invention is intended to prevent that rotation by means of the extension member 28 extending through openings 26 of adjacent balusters 20. Extension member may be constructed of metal providing a metal to metal securing of balusters 20 in the desired position by extension member 28.

Referring to Figure 6, 6A and 6B, a segment of railing system 10 is shown with a pair of adjacent balusters 20 extending below upper rail 14 and above lower rail 16. If balusters 20 are aligned in opposite directions when railing system 10 is constructed, openings 26 would be in horizontal alignment. However, because one baluster has its curved portion 30 facing away from the deck and the other baluster 20 has its curved portion 30 facing toward the deck, a gap of distance 60 would exist between those adjacent balusters 20. The distance 60 between balusters 20 would again be greater than distance 56 and exceed relevant building codes. That distance 60 could also enable a child or animal to slip between those adjacent balusters 20 to fall from the deck or balcony. To prevent the construction of railing system 10 with curved portions 30 of adjacent balusters 20 facing in opposite directions, the cross-section of extension member 28 and opening 26 is asymmetrical about a vertical axis, such as the longitudinal axis 46 of baluster 20. That is, while vertical face 32 and the rear face (not shown) of extension member 28 are generally flat and vertical, the opposite upper angled faces 34 and 40 and lower angled faces 36 and 42 form corresponding apexes 38 and 44 on the side opposite to vertical face 32 and rear face of extension member 28.

As depicted in Figure 6B, if adjacent balusters are facing in opposite directions, extension member 28 will extend through one baluster 20 which has opening 26 positioned so that the cross-section of extension member 28 corresponds to that of opening 26. However, the other baluster 20, facing in the opposite direction, will not have its opening 26 in cross-sectional alignment with extension member 28. It can be

seen that apex 44 of extension member 28 is not in alignment with apex 38 of opening 26 of that baluster. As a consequence, extension member 28 will not extend through that baluster 20 until it is rotated 180 degrees so that its curved portion 30 faces outwardly in proper alignment with the adjacent baluster 20.

Figure 7 depicts railing system 10 with stairway segment 62 connected to vertical segment 64. Stairway segment 62 is positioned above a set of stairs 66 and horizontal segment 64 is positioned above deck 68. Deck 68 includes a generally horizontal support surface 70.

It can be seen that while horizontal segment 64 has horizontal upper and lower rails 14 and 16, stairway segment 62 has upper and lower rails 72 and 74 which are angled from the horizontal to correspond generally to the stairway angle 76. Stairway angle 76 can vary but is generally between 30.5 degrees and 34.5 degrees, with an average of 32.5 degrees.

Extension member 28 extends through openings 84 of balusters 82 of stairway segment 62 as best seen in Figure 7A. Extension member 28 is angled from the horizontal to be parallel with upper and lower rails 72 and 74. However, balusters 82 remain in a vertical position in stairway segment 62, parallel with balusters 20 of horizontal segment 64. As shown in Figure 7A, opening 84 of baluster 82 is angled at the same angle as stairway angle 76 with higher end 86 above lower end 88. Higher and lower ends 86 and 88 are positioned to ensure that curve portion 30 faces outwardly along stairway segment 62 when extension member 28 extends through opening 84. This requires a left side baluster 84 and right side baluster (not shown) for a stairway each having the higher end 86 and lower end 88 on opposite sides of baluster 82. This ensures that extension member 28 will extend through balusters 82 when extension member 28 is angled from the horizontal equivalent to the stairway angle 76 with balusters 82 oriented vertically.

Because much stairway construction is not undertaken with a precise degree of accuracy, stairway angle 76 and the equivalent angle of stairway section 62 from the horizontal can vary by 1 or 2 degrees from the optimal angle of 32.5 degrees. Rather than requiring exact precision in the construction of set of stairs 66 and stairway segment 62, baluster 82 may include opening 84 with upper and lower ends farther apart as compared to upper and lower edges 78 and 80 of extension member 28. Figures 8 and 8A depict such an opening 84 which has a greater distance between upper end 90 and lower end 92 as compared to the distance between upper edge 78 and Lower edge 80. This provides some "play" between extension member 28 and opening 84. Figure 8A depicts extension member in its position within opening 84 closest to the horizontal with upper edge 78 contacting upper end 90 of lower opening end and lower edge 80 contacting lower end 92 of higher opening end 86.

Figure 9 and 9A depicts the opposite extreme, with extension member 28 in its position farthest from the horizontal. In that position, lower edge 80 contacts lower end 92 of lower opening end 88 and upper edge 78 contacts upper end 90 of higher opening end 86.

Figures 10 and 10A depict a position generally midway between the positions depicted in Figure 8 and 9. Extension member 28 is positioned with upper edge 78 and lower edge 80 generally parallel with the inner, upper and lower surfaces (shown in dotted outline) of opening 84.

While the extent of "play" of extension member 28 within opening 84 can vary depending on the desired range of angles desired, in a preferred embodiment, the angle between extension member 28 and the horizontal of Figures 8 and 8A (closest to the horizontal) can be about 30.5 degrees and the angle from the horizontal as depicted in Figure 9 (farthest from the horizontal) can be about 34.5 degrees. If the angle from the horizontal as represented by opening 84 is the optimal angle of 32.5 degrees, this permits a range of about 2 degrees in either direction from that optimal angle.

As will be apparent to those skilled in the art to which the invention is addressed, the present invention may be embodied in forms other than those specifically disclosed above, without departing from the spirit or essential characteristics of the invention. The particular embodiments of the invention described above and the particular details of the processes described are therefore to be considered in all respects as illustrative and not restrictive. The scope of the present invention is as set forth in the appended claims rather than being limited to the examples set forth in the foregoing description. Any and all equivalents are intended to be embraced by the claims.